REMARKS

Applicants respectfully point out that claim 31, as amended, includes all of and only the limitations of previously presented independent claim 31 and dependent claim 32. Claim 32 has been canceled and claim 34 which had depended from claim 32 has been amended to now depend from claim 31 with no other changes. Applicants believe no further search is required by the Examiners since both claims 31 and 32 were rejected in the Examiners action of September 21, 2005 under 35 U.S.C. 103 as being unpatentable over Burghartz et al. (5,793,272) to which the arguments *infra* form part of this response.

The Examiner has stated that claims 33, 35, 37, 38, 39, 45-61 would be allowable if rewritten in independent form including all the limitations of the base claim an any intervening claims. In response, Applicants have amended claims 33, 35, 37 38 and 45 to be in independent form and included the limitations of base claim 31, as rejected, and all intervening claims.

The Examiner rejected claims 31, 32, 34 and 40 under 35 U.S.C. 103 as being unpatentable over Burghartz et al. (5,793,272).

The Examiner rejected claim 36 under 35 U.S.C. 103 as being unpatentable over Burghartz et al. (5,793,272) in view of Breen (5,363,080).

The Examiner rejected claims 41-44 under 35 U.S.C. 103 as being unpatentable over Burghartz et al. (5,793,272) in view of Goldfarb (5,148,062).

Applicants respectfully traverse the §103(a) rejections with the following arguments.

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35 USC § 103 Rejections

As to claim 31 the Examiner states that "the patent discloses an inductor in figure 11 comprising a top surface, the surface covered by layer (20'), a bottom surface, the surface covered by conductor (18), and sidewalls, the outer surfaces of element (26) that are covered by layer (18'), a lower portion of the inductor (104) extending into but not completely through a single dielectric layer (14) formed on semiconductor substrate (12) and the upper portion of the inductor extending above the dielectric layer (14), the inductor provided with means of electrical contact (22,24) (see front page figure). The prior art discloses all subject matter claimed but may have used a second dielectric layer (14') on the first dielectric layer (14) where said upper portion extends into. However, the second dielectric layer is immaterial in the context of the claimed structure because the upper portion is indeed above the first dielectric layer irrespective of the existence of the second dielectric layer. Therefore, it would be obvious to one skilled in the art to safely conclude the claim expression "single dielectric layer" as fully addressed by layer 14 since the layer functions independent of the second layer formed on it."

As to claim 32, the Examiner states that "the lower portion of the inductor composed of a core conductor (104) and a conductive liner (18)."

Applicants contend that claim 31, as amended, is not obvious in view of Burghartz et al. because Burghartz et al. does not teach or suggest every feature of claim 31. For example, Burghartz et al. does not teach or suggest "said upper portion of said inductor consisting of said core conductor."

The Examiner notes, relative to the rejection of claim 31, that the inductor of Burghartz et al. extends into dielectric 14'. The Examiner maintains relative to the rejection of claim 32, that

Burghartz et al. teaches "the lower portion of the inductor composed of a core conductor (104) and a conductive liner (18)".

Burghartz et in states in part in col. 5, lines 38-44 that "The liner film 18 lines the bottom and sidewalls of the trench." and "The inductance (L) per line length of the spiral inductor 10 is increased by using a ferromagnetic material, such as Permalloy, AlNiCo, etc. for the liner film 18."

Therefore, a person of ordinary skill in the art, familiar with the Damascene process taught by Burghartz et el, would conclude that the upper portion of the inductor must also include core conductor (104) and conductive liner (18) since it is not possible to form liner 18 only on the lower portion of the inductor and the liner cannot be removed if dielectric layer 14' is present. Thus, the upper portion of Burghartz et als. inductor does not *consist of* a core conductor, since *consisting of* precludes any other than the recited elements.

Based on the preceding arguments, Applicants respectfully maintain that claim 31 is not unpatentable over Burghartz et al. and is in condition for allowance. Since claims 32 34, 36, 40-44, and 52 depend from claim 31, Applicants respectfully maintain that claims 32 34, 36, 40-44, and 52 are likewise in condition for allowance.

As to claims 43 and 44 the Examiner stated that "the prior arts disclose all subject matter claimed but may have been silent about the Q factor of inductors. But clearly the Q factor of an inductor can be defined as $Q = WoL/R$ where L is the inductance, R is the characteristic resistance with the inductor conductors, and Wo is the resonant frequency of the signal applied in a resonant circuit using the inductor. Since resonant frequency of a tuning circuit, $fr = 1/(2Pi(\text{square-root of } LC))$ and $WL = 2(Pi)(fr)$, $Q = 1/R(\text{square-root of } (L/C))$. Therefore the Q =-

factor of an inductor cannot be determined from the elements associated with the inductor alone but with other elements associated in a given tuning circuit. Clearly at least capacitance is part of the elements that defines resonant frequency that defines the Q factor associated with a given inductor in the circuit. Therefore, although directly proportional to inductance and inversely proportional to the resistance of inductive conductors, the Q factor involves capacitance and is also a function of resonant frequency. It is also clear that Goldfarb's inductor has a very high inductance, which produces high Q value when applied to resonant circuits. Therefore, it would have been obvious to one skilled in the art to expect the inductor of Goldfarb matching claimed Q-factor value of the claimed invention, since the inductance of the inductor in the patent is higher that the claimed inductance that is claimed to produce the claimed Q when applied in a resonant circuit partially because Q factor is proportional to inductance.

The Examiner has made the statement that "the Q factor involves capacitance" after stating "Q = WoL/R" which does not include capacitance. In order to get capacitance into the Q equation, the Examiner alleged that an equation Q = 1/R(square root LC) could be derived from fr = 1/2pi(square root LC) and WL = 2(pi)(fr). The Examiner then asserts, based on these arguments, that "the Q factor of an inductor cannot be determined from elements associated with the inductor alone." which in turn leads to the further assertion by the Examiner that since "Goldfarb's inductor has a very high inductance" "it would have been obvious to one skilled in the art to expect the inductor of Goldfarb matching the claimed Q-factor."

First, not only do Applicant not recognize equation WL = 2(pi)(fr) as a valid relationship. Applicants do not understand what W in equation WL = 2(pi)(fr) represents and request clarification.

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Second, it is well known that Q is defined as the width of the peak at -3db on a plot of Vin/Vout vs $fr = 1/2(pi)(square\ root\ LC)$ (see pages 41-42 of "The Art of Electronics" by Paul Horowitz and Winfield Hill, published by Cambridge University Press, 2nd Edition 1989). This width can be measured for an inductor alone or for a circuit containing an inductor. That, in a circuit, this width can be effected by other elements in a circuit containing the inductor means only that the Q of the circuit is influenced by other circuit elements, not the Q of the inductor. For example, an external resistor can be added to a circuit to make the circuit *behave as if it contained* a low Q inductor. Applicants are claiming a Q factor of an inductor in claim 43, to wit "wherein said inductor has a Q factor" and are not claiming a Q factor of a circuit.

Third, Goldfarb teaches only the inductance and operating frequency of the inductor, but not the resistance of the inductor and without knowing resistance it is impossible to calculate the Q factor of the inductor. In fact, Goldfarb's circuits have so many elements that have unknown values it would be impossible to calculate even the *effective* Q of the inductor in Goldfarb's circuits. Therefore applicants maintain it is not "obvious to one skilled in the art to expect the inductor of Goldfarb matching the claimed Q-factor" as the Examiner alleges.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invite the Examiner to contact the Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and/or credit Deposit Account 09-0457.

Respectfully submitted,
FOR:
Edelstein et al.

Dated: /0/27/2005

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